

WHAT IS CLAIMED IS:

1. An electrosurgical device for use with a power supply, comprising:
a shaft having a shaft distal end portion and a shaft proximal end portion;
an electrode assembly comprising at least one active electrode disposed near the shaft distal end portion and adapted to be electrically coupled to a first pole of the power supply;
a connector fixedly engaged to the shaft proximal end portion adapted to couple the device to the power supply; and
at least one temperature-indicating element disposed on an exterior of the shaft to be responsive to temperature changes adjacent to the device, wherein the temperature-indicating element undergoes a change in chromatic appearance over a pre-determined temperature range.
2. The device of claim 1, wherein the pre-determined temperature range is about 40°C to 95°C.
3. The device of claim 1, wherein the at least one temperature-indicating element is adapted to display a temperature value over the pre-determined temperature range.
4. The device of claim 1, wherein the at least one temperature-indicating element displays a message when exposed to a pre-defined temperature.
5. The device of claim 1, wherein the message is alpha-numeric.
6. The device of claim 1, wherein the at least one temperature-indicating element comprises a thermochromic material.
7. The device of claim 1, wherein the at least one temperature-indicating element is adapted to substantially change from a first chromatic appearance to a second chromatic appearance when subject to the pre-determined temperature range and to substantially reverse from the second chromatic appearance to the first chromatic appearance when not subject to the pre-determined temperature range.

8. The device of claim 1, wherein the at least one temperature-indicating element comprises a thermochromic composition selected from the group consisting of a leuco dye and a liquid crystal.

9. The device of claim 1, wherein the at least one temperature-indicating element comprises a thermochromic paint or a thermochromic ink.

10. The device of claim 1, wherein the electrode assembly comprises a support matrix which contains at least one of the active electrodes, wherein the at least one temperature-indicating element is disposed on, or proximal to, the support matrix.

11. The device of claim 10, wherein at least one active electrode extends laterally from the shaft.

12. The device of claim 11, wherein the at least one temperature-indicating element is disposed on a portion of the shaft opposite the direction in which the active electrode extends.

13. The device of claim 1, wherein at least one active electrode extends distally from a distal tip of the shaft, and wherein the at least one temperature-indicating element is disposed proximal to the active electrode.

14. The device of claim 1, wherein the electrode assembly further comprises at least one return electrode adapted to be coupled to a second pole of the power supply and disposed at the distal end portion of the shaft, and wherein the at least one temperature-indicating element is disposed proximal, adjacent, or distal to the return electrode.

15. The device of claim 1, wherein the at least one temperature-indicating element has a length in the range of from about 1 mm to 3 cm, and a width in the range of from about 1 mm to 5 cm.

16. The device of claim 1, further comprising a fluid delivery element for providing an electrically conductive fluid capable of forming a conductive fluid path between the electrode assembly and return electrode.

17. The device of claim 1, wherein the at least one temperature-indicating element comprises an annular band having a thermochromic material incorporated therein.

18. The device of claim 1, wherein the shaft is at least partially encased within a sheath, the sheath encasing the at least one temperature-indicating element, and wherein the sheath comprises a biocompatible material.

19. The device of claim 1, wherein the at least one temperature-indicating element is thermally insulated or thermally isolated from a surface of the shaft.

20. The device of claim 1, wherein the at least one temperature-indicating element comprises a printable medium and a thermochromic pigment.

21. The device of claim 1, wherein the device comprises a bipolar electrosurgical device adapted for applying RF electrical energy to a target tissue.

22. The device of claim 1, wherein the first chromatic appearance.

23. The device of claim 22, wherein the at least one temperature-indicating element comprises a first color and changes appearance to a second color.

24. The device of claim 1, wherein the at least one temperature-indicating element is a first temperature indicating element and the pre-determined range is a first predetermined range, where the device further comprises a second temperature indicating element disposed on an exterior of the shaft, wherein the second temperature indicating element changes appearance over a second pre-determined temperature range.

25. The device of claim 24, wherein the first and second pre-determined ranges are substantially the same.

26. The device of claim 22, wherein the first and second pre-determined ranges are different.

27. The device of claim 1 wherein the at least one temperature-indicating element is located adjacent the electrode assembly.

28. The device of claim 27 wherein the at least one temperature-indicating element is located superior to the at least one active electrode.

29. The device of claim 1 wherein the at least one temperature-indicating element is located proximal to the electrode assembly.

30. The device of claim 1, wherein the connector comprises a cable having a distal end fixedly attached to the shaft proximal end portion, and a proximal portion adapted to engage the power supply.

31. The device of claim 1, wherein the connector is adapted to removably engages a cable where the cable couples the device to the power supply.

32. The device of claim 1, wherein at least one of the temperature-indicating elements is configured about the shaft so that at least a portion of the temperature-indicating element is viewable from any side of the shaft.

33. The device of claim 32, wherein the at least one of the temperature-indicating elements is placed circumferentially about the device shaft.

34. An medical device for use with an energy delivery unit, comprising:
a shaft having a shaft distal end portion and a shaft proximal end portion;
an energy delivery assembly comprising at least one energy delivery element disposed near the shaft distal end portion and adapted to be coupled to the energy delivery unit;

a connector fixedly engaged to the shaft proximal end portion adapted to couple the device to the energy delivery unit; and

a first means for providing a visually indication of a particular temperature or range of temperatures in a region adjacent a portion of the shaft.

35. The device of claim 34, further comprising a second means for identifying a particular temperature or range of temperature in a region adjacent a portion of the shaft.

36. The device of claim 35, wherein said electrode assembly further comprises at least one return electrode adapted to be coupled to a second pole of the power supply.

37. The device of claim 35, wherein said first means for identifying is located adjacent the electrode assembly.
38. The device of claim 35, wherein said second means for identifying is located adjacent said first means for identifying.
39. The device of claim 35, wherein said second means for identifying is located along the shaft proximally to said first means for identifying.
40. The device of claim 34, wherein the connector comprises a cable having a distal end fixedly attached to the shaft proximal end portion, and a proximal portion adapted to engage the power supply.
41. The device of claim 34, wherein the connector is adapted to removably engages a cable where the cable couples the device to the power supply.
42. The device of claim 34, wherein the energy delivery assembly is adapted to provide energy selected from the group consisting of ultrasound, radio frequency energy, mechanical, laser, thermal, microwave, chemical, and radiation.
43. A method of monitoring a temperature when using an electrosurgical device according to claim 1 at a surgical site during a procedure, comprising:
visually observing the chromatic appearance of the temperature-indicating element, wherein the appearance of the temperature-indicating element is indicative of a temperature condition at region adjacent a portion of the shaft.
44. The method of claim 43, wherein the portion of the shaft is a distal end portion.
45. The method of claim 43, wherein the portion of the shaft is proximal to the distal end portion.
46. The method of claim 43, wherein the at least one temperature-indicating element comprises a thermochromic composition selected from the group consisting of a leuco dye and a liquid crystal.
47. The method of claim 44, further comprising:
prior to said positioning the shaft distal end portion of the device at the

surgical site;

applying energy to a target tissue at the surgical site via the device; and
adjusting or discontinuing the application of energy to the target tissue
according to a chromatic appearance exhibited by the temperature-indicating element.

48. The method of claim 44, wherein said step a) comprises estimating a temperature of a target tissue at the surgical site prior to applying energy to the target tissue via the electrosurgical device.

49. The method of claim 44, wherein the temperature-indicating element undergoes a readily discernible color change in response to exposure of the shaft distal end portion to at least one pre-defined temperature.

50. An electrosurgical instrument for applying electrical energy to tissue at a target site, the instrument comprising:

a shaft, a proximal end and a distal end;

a non-electrically conducting support disposed at the distal end, said support having an annular configuration and a tissue-contacting surface having an annular recess therein;

a temperature indicator positioned on said support;

an active electrode positioned within the annular recess; and

a return electrode positioned about an outer surface of said support

51. The electrosurgical instrument of claim 50 wherein said indicator is band-shaped.